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ABSTRACT

This is another report in a series of programs dealing with the problems of a technological age. It is assumed that teachers will use both parts of this report. Part I deals with the problems of technology and how it affects our lives. It also discusses the energy crisis created, in part, by technology and deals specifically with coal and petroleum resources. Part II (this publication) continues the discussion of energy sources and relates them to each other. It begins with our resources of natural gas and continues with heating oil. The pollution problem raised by the automobile is considered. Attention is given to recycling materials. The benefits, as well as the disadvantages, of living in a technological age are considered. Consumer problems created by technology are considered. For each topic in this guide, desired student understandings are specified, pupil and teacher learning activities are suggested, and sources of information are cited. (EB)

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Coping with The Problems of a Technological Age

Part II

one of a series for expanded programs
in CONSUMER EDUCATION

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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Bureau of Secondary Curriculum Development
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INTRODUCTION

This is the second part of the material dealing with the problems of a technological age. It is assumed that teachers will be using both parts and will have read the Foreword and Introduction to Part I as a background for the continuing study.

Part I deals with the problems of what technology is and how it affects our lives. The first portion also discusses the energy crisis, created in part by technology, and deals specifically with coal and petroleum resources. Part II continues the discussion of energy sources and relates them together. It begins with our resources of natural gas and continues with heating oil. The pollution problem raised by the automobile is considered. Attention is also given to the matter of recycling materials. The benefits as well as the difficulties of living in a technological age are considered. It also deals with the consumer problems created by technology. Consideration is given to life styles and values in the hope that involvement of young people in decision making may resolve these issues in a manner that gives due consideration to all factors in the issue, weighing costs against benefits.

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
IS THERE A SHORTAGE OF NATURAL GAS?		
. Most authorities agree that there is a shortage of natural gas.	. Ask the public utility public relations officer of the company which serves your area to report on the supply of natural gas available in his service area and probable demands for this product. . Secure a copy of "New Sources of Gas---Where and When?" American Gas Association, 1515 Wilson Boulevard, Arlington, Virginia, 22209. Consider the recommendations of this report. . Read the newspaper and periodical reports of the attempts to develop new sources of gas through nuclear stimulation in cooperation with the U.S. Atomic Energy Commission. If you had been in the area of the test, would you have joined the consumer group who, in protest, picketed the approaches to the experimental underground explosion?	. "Government officials and executives of private industry have spoken repeatedly about the natural gas shortage with one basic conclusion: the United States will never again be able to meet all of its needs for gas energy from conventional sources. "The Government's view of the situation was summed up recently by an Administration spokesman: 'We do have a gas shortage, it is going to get a lot worse, help is a long way off, and we shall need every cubic foot we can lay hold of from any source.' "A widely respected independent forecasting group—the Future Requirements Committee—estimates that gas requirements by the year 1990 could be nearly twice what they are today. Other governmental and private groups have supported this projection. "Sources of natural gas in readily accessible areas have largely been tapped and are producing the bulk of the gas consumed in our country now. "Where will the gas be found to meet growing needs?" New Sources of Gas --- American Gas Association, 1515 Wilson Boulevard, Arlington, Virginia 22209

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
		"Nuclear power is most often thought of in conjunction with nuclear generation of electricity, but atomic power can play an important role in the development of significant reserves of natural gas in this country. "An estimated 300-plus trillion cubic feet of gas are locked in relatively impermeable rock formations in the Rocky Mountain region. Conventional drilling techniques can withdraw only small quantities of this gas with each well, making recovery of the reserves uneconomic. "Two experiments have already been conducted in which underground nuclear explosives were detonated to fracture dense rock formations and allow gas from a wide area to reach a well. Each of the first two experimental wells produced in only a few months many times the amount of gas recovered over a period of years from conventional wells in the same area." Ibid.

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
WHAT ARE THE EFFECTS OF THE GAS SHORTAGE FOR CONSUMERS?	. Find out the effects of the gas shortage on consumers. Have gas supplies for home heating been curtailed? Have gas prices increased? Have plants in your area been restricted in the use of gas? Has this restriction had any effect on employment? Will the lack of gas lead to increased costs of consumer products?	. "The lack of adequate gas supplies is hampering economic growth where industrial and commercial needs cannot be met. Jobs are not increasing as they should. The tax base is being restricted. In some areas gas companies cannot even take on new residential customers." Ibid.
WHAT STEPS HAVE BEEN TAKEN AND WHAT ADDITIONAL STEPS ARE NECESSARY TO INCREASE THE GAS SUPPLY?	. Research the problem of gas supplies. What steps is the government taking, and what steps is industry taking to increase the supply? (Newspaper reports include steps being taken to import natural gas, under pressure, from Russia and the Middle East.) . With the help of the science teacher, consider the possibilities of making synthetic gas from oil.	. "Increases in allowable gas prices, anticipation of major new offshore lease sales, and the introduction of legislation to provide price stability in contracts should help assure renewed incentives for exploration. "The investment needed to bring additional gas supplies to the nation's markets is staggering. It has been estimated that to increase the available supply from supplemental sources by some one trillion cubic feet per year will require as much as $5 billion. This means increasing

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
		. the industry's capital investment by about 10 percent for a five or six percent increase in supply." Ibid.
		. "The fastest and most easily accessible source of major new natural gas discoveries is the off-shore areas of the outer continental shelf bordering the United States, particularly those in the Gulf of Mexico." Ibid.
ARE THE PROBLEMS OF A GAS SHORTAGE AND A HEATING OIL SHORTAGE RELATED?		
. Yes. As a gas shortage develops, consumers turn to alternative heat sources.	. Poll the class to see what source of fuel is used for home heating. Have any families changed from one source to another? Why?	. A natural gas shortage has developed. Businesses are being rationed. Producers claim this shortage is due to the fact that "Government controls have for nearly 20 years depressed the price of natural gas to unrealistically low levels, and have ignored the consumer's long-term stake in security and adequacy of supply. As a result, demand has increased far faster than additions to reserves. When large industrial users couldn't get enough natural gas this past heating season, they began using large volumes of home heating oil. Demand for heating oil went through the roof." Mobil Oil Company.

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
WHY DOESN'T INDUSTRY USE HEAVY RESIDUAL FUEL OIL OR COAL INSTEAD OF HOME HEATING OIL?		
. Shortages of fuels that meet environmental standards are present in many fields.	. Discuss alternative energy sources open to industrial use. What is meant by high-sulphur content? How do environmental restrictions affect the use of high-sulphur fuels?	. Not enough heavy residual oils that meet environmental restrictions are available to meet the demands of industry, and the same shortage of coal that meets environmental standards applies.
IS THE ENERGY SUPPLY THE SUM OF MANY INTERRELATED PARTS?		
. Yes. Every part of the supply affects every other part.	. Discuss the fact that shortages or competion for any type of energy affect the supply of other types. Natural gas competes with light and heavy heating oil and coal as an energy source. Gasoline competes with home heating oil in a refinery. All are part of a total energy system.	. "What we have to do is develop socially and economically acceptable balances. There is no automatic conflict between a cleaner environment and greater supplies of energy. The most unacceptable risk of all is to fail to develop adequate and secure supplies of energy so America can continue to prosper." Ibid.
WHAT SOLUTION DOES THE OIL INDUSTRY SEE FOR THE PROBLEM?		
	. Ask pupils for suggestions as to the solution of the energy problem. Consider tidal and solar energy, atomic power, coal, oil, gas, as well as changes in use and possibly changes in environmental or governmental regulations.	. The Mobil Oil Company suggests the following solutions: "Use all energy more efficiently. Control automotive emissions in a way that won't waste so much gasoline. Build the Alaskan pipeline. Deregulate the price of at least new supplies of natural gas. Explore offshore.

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
		Permit the financial incentives to build more refineries-where they're needed. Go all-out in research of oil shale and nuclear power, to make these energy sources economic and environmentally safe."

BACKGROUND INFORMATION

In his message to Congress of 4/18/73, President Nixon called for the following steps to be taken to meet the energy needs of the country.

- Increase domestic production of all forms of energy
- Act to conserve energy more effectively
- Reduce excessive regulatory and administrative impediments
- Act with other nations to conduct research in the energy field
- Utilize to better advantage our scientific and technological capabilities
- Initiate a program to conserve energy

Specifically, he recommended to Congress that:

- Some easing of price controls on new gas wells be provided
- Exploration and development of off-shore oil and gas reserves be expedited
- Congressional action to remove restrictions on the Alaskan pipeline be taken
- A program to utilize the recoverable deposits of shale oil be developed
- A program of government leasing of lands with geothermal possibilities be speeded up
- Expanded development and utilization of coal resources be undertaken
- Encouragement be given to nuclear energy research and development, while maintaining environmental safety restrictions
- Encouragement of domestic exploration for gas and oil fields through investment-credit tax measures be provided.

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
	. Consider the recommendation made by President Nixon to Congress regarding the energy crisis. . Have the class draw up their own recommendations as to what should be done, using these sources and others, and considering the desires of consumers to continue to use unlimited energy supplies.	. "We can increase domestic energy production. We should take prompt action to stimulate the development of our indigenous energy resources. We have an adequate resources base; our problem is to get new supplies at a faster rate. We need some practical trade-offs in the ecological area. The production and consumption of energy inevitably involves some ecological impairment. We cannot achieve our environmental goals overnight and still give the U.S. economy all the energy it requires and the public demands. Some pragmatic, graduated approaches to our ecological goals are urgently needed. Here the Federal government should take decisive action—and very promptly." Ibid. . "Wait A Minute — Let's Not Go Overboard On Ecology," Maurice H. Stans, U.S. Secretary of Commerce, in a speech delivered before the National Petroleum Council, July 15, 1971.

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
		. "The Geography of Survival," American Trucking Associations, Inc., 1616 P Street, N.W., Washington, D.C. 20036 . "Fuel Needed for Years Ahead," John Chamberlain, Albany Times-Union, January 4, 1972.
WHAT ABOUT AUTOMOBILES AND THE POLLUTION PROBLEM?		
. As of the end of 1971 there were 113 million automotive vehicles in the country, each contributing in greater or lesser degree to the problem of air pollution. (It is estimated that 60 percent of air pollution is caused by the internal combustion engines of automobiles.)	. With the help of the science teacher have the class review what is known about the problems of air pollution caused by the internal combustion engine. . Review current legislation on the State and Federal level aiming at curbing this pollution.	. "If one automobile is beautiful, can a billion cars doom a civilization? Maps of Los Angeles show that two-thirds of the city is either roadway or parking facilities. About two-thirds of all urban air pollution is caused by autos. The growth of autos in New York City, air conditioned autos (and air conditioned buildings) has resulted in a tremendous growth in waste heat which in the summertime reminds one that the road to hell is paved with good intentions. Any solution to the problem of the auto transport system must be tempered by the knowledge that economically our society is deeply involved with that system: one out of seven workers in the United States depends on the auto industry for his livelihood; municipal, state, and Federal governments derive more than $11

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
		billion annually from auto taxes and highway tolls. This leads to one of the fundamental questions facing us. Are we prisoners of our technology? Are machines meant to serve men or are men made for machines?" "Man Builds–Man Destroys," New York State Education Department, Albany, N.Y. 12224
. It would be possible to prevent a large part of the pollution caused by automobiles but there is a cost both in dollars and in lessened efficiency to do so.	. Have the automotive shop teacher or a science teacher explain the steps that are being taken to prevent pollution caused by cars.	. The Society of Automotive Engineers, the Engineers from Aerospace Corporation, and the Environmental Protection Agency estimate the cost of meeting Federal emission standards set for 1975 (since postponed to 1976) at $10 billion a year. This is the cost of equipping autos with catalytic convertors that change carbon monoxide, hydrocarbons, and oxides of nitrogen into harmless gases. If these systems have to be replaced every 25,000 miles as some engineers predict, the cost to the average car owner could go as high as $1,150 above the cost of comparable 1970 models, the researchers said.
. Catalytic converters will lessen engine efficiency, thus calling for greater gasoline consumption.	. In addition to the costs of equipping cars with anti-pollution devices there is a further consumer cost (and a pollution cost) in that cars so equipped would operate less efficiently, thus consuming more gasoline. In turn, the extra gasoline consumed will add to the pollution problem.	

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
	. Have pupils who own, or whose families own, newer cars describe some of the problems with present anti-pollution equipment. Do cars start with more difficulty? Do they consume more gasoline? Is there a cost to maintain or replace anti-pollution valves and other devices?	. "Engineers estimated the initial cost of pollution equipment alone would add between $229 and $388 to the price of the car, depending on what system is used to meet the government's standards." . "Man Against His Environment," a television series presented by the State University of New York at Albany. Watch for the presentation of the program or write for the guide from the Education Department. The entire series of half-hour programs is available on video tape from the State Education Department for use by local schools, colleges and universities, and other educational institutions. The series deals specifically with actions any individual may take to "correct" elements of environmental abuse. Among problems discussed are air and water pollution, misuse of the earth's natural resources, noise pollution, impact of continued population growth, and future sources of energy.

Oh, Oh! Here Come the Catalysts.
by Jude Wanniski, condensed from an article in The Wall Street Journal, Monday, May 21, 1973

Consumer Costs

The cost to the consumer for this dual-catalyst system would be between $300 and $400 per car, about $80 each for core replacement of the two converters every 25,000 miles, and a 25% or more fuel penalty, which one industry source says would require extra oil imports of 1 billion barrels of crude by 1985. Driveability would also suffer, which means that if the catalysts burn out, as they have a way of doing, the driver would notice an improvement in his car's performance, which would not be an incentive for him to have the catalysts replaced.

A national network of inspection stations would have to be built to insure compliance. As yet the only known test procedure to determine whether the catalysts were working up to snuff would require each car to undergo several hours' checking by instruments costing more than $50,000 each.

In addition, there is a high probability that all this effort and expense would go for naught, that though they might pass initial tests, in actual use the catalysts would fail and thus not clean up much air pollution. Consider the description by the National Academy of Sciences, one Mr. Muskie termed "dispassionate": "The catalyst is too cold during start up and too hot during a long down-hill cruise. The air-fuel ratio is too rich on idle and too lean during high speed. The exhaust gas flow is slow during idle and fast during upgrade cruise. The catalysts are also exposed to repeated cycles of heating and cooling, evaporation and condensation of water, pulsating flow from exhaust gases, vigorous shaking on the road, and a variety of poisons, including lead and sulphur. Under these conditions, catalysts detericrate rapidly."

Despite these advantages, catalysts seem the only way to meet, technically if not in practice, the standards of the Clean Air Act by the 1976 deadline the law allows. But some time a bit further in the future, it now seems likely the act's standards or something nearly as tough could be met in ways that would not only clean up the air but improve the automobile.

The present quandary isn't what either Mr. Muskie or Congress had in mind when they passed the Clean Air Act. The assumption then was that by setting extremely tight standards for 1975 and 1976 instead of for 1980, as the Nixon administration had proposed, Detroit would be forced to consider different ways of powering American autos, or at least one or more of the Big Three would strike off in a new direction and provide vigorous competition between power sources. At the time, there was the vague notion on Capitol Hill that there would be a rush to turbines, rotary engines or even steam or electric cars.

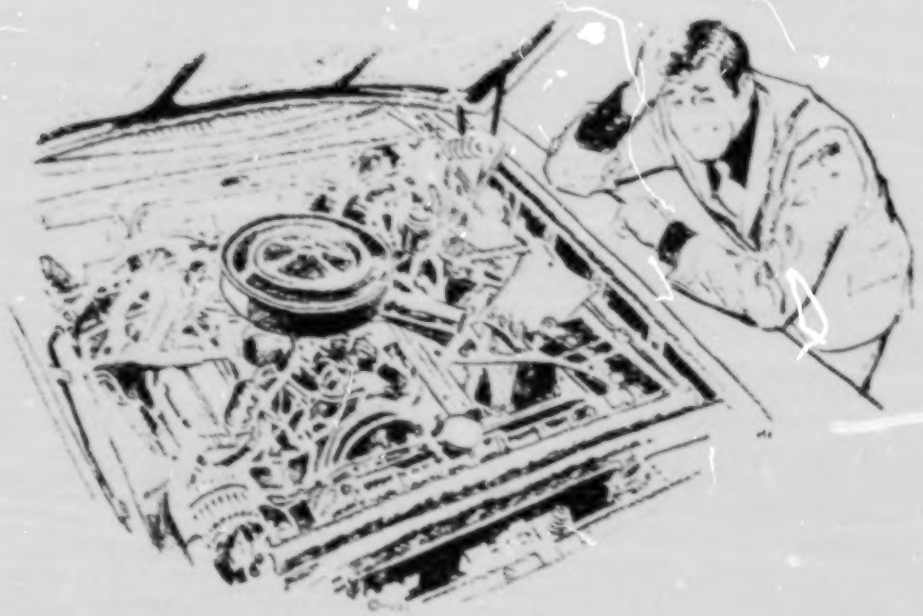
A Costly Commitment

As the auto makers prepare to go before Sen. Muskie to ask for relief, they are aware that they never did much to clean up emissions until the government made them do it, and that the effort is not now going to be abandoned. But for his part, Sen. Muskie must also be aware that Detroit is going in the wrong direction, and that it can't change course unless it can get those catalytic converters off its back.

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
. Banning "leaded" gasoline will make cars run less efficiently.	. We are all familiar with the fact that leaded gasoline tends to make many cars operate better, with less knocking and "pinging." Yet the lead emitted into the atmosphere is a pollutant. What should be the consumer's attitude toward banning the sale of leaded gasoline? toward the installation of pollution equipment?	United Press report, quoted in Albany Times-Union, January 9, 1973. . Other pollution experts say these estimates of costs are too high. "Automobile buyers should benefit from a Government decision to delay certain pollution standards from 1975 until 1976 in most of the U.S. "Federal experts figure the extra time will permit companies to cut the cost of adding catalytic converters, which render pollutants harmless, from the $255-$300 previously estimated to $160-$170 per car. What's more: Government researchers will ask Congress to ease the law that requires automobile emissions of oxides of nitrogen to be reduced 90 percent by 1976. New data show that's far more of a cleanup than really needed. This legislation alone had been expected to nearly double the cost of car antipollution equipment and cut gasoline mileage by 20 percent." U.S. News and World Report, April 23, 1973, p. 13.
. Congress has set clean air standards for 1976. Some observers feel that these standards are so severe that gasoline rationing will be necessary in nearly 30 U.S. cities. It is claimed that 400,000 jobs will be lost in Los Angeles and and its suburbs as a result of this action.	. Secure a copy of the standards set for 1976 by the Environmental Protection Agency. Discuss these standards in terms of their impact upon the environment, on employment, and on the consumer's pocketbook.	

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
. Despite the problems, solid progress has been made in recent years in cutting down on the amount of pollutants in the air. According to the following advertisement of the oil companies of America: "More Cars, But Less Pollution Air pollution resulting from automobile emissions has been significantly reduced. As 1971 ended, there were 113 million automotive vehicles in this country. New equipment and new gasolines have reduced total hydrocarbon emissions in the air to the levels of 1960, when there were 74 million vehicles. Total carbon monoxide emissions are down to the levels of 1963, when there were 85 million vehicles. As older cars are replaced by new ones with better emission controls, there will be further declines of hydrocarbons, carbon monoxide, and even oxides of nitrogen in the air. "Sulfur Emissions Are Down. Another source of air pollution is the sulfur released from burning oil. Since World War II, the	. America is trying to achieve the twin goals of providing needed energy while still maintaining a clean environment. To provide needed energy sources will require the development of additional domestic energy: oil, natural gas, coal, nuclear power, and perhaps hydroelectric, and tidal or solar energy. What should be the position of consumers regarding - exploratory drilling for oil? - the development of the Alaska pipeline? the building of additional nuclear facilities, perhaps near concentrations of population? Sewage treatment and water purification? - recycling of aluminum, steel, glass, rubber, and paper? - rebuilding blighted urban areas? . What should be the consumer's attitude toward public and private development of new supplies of energy?	. William A. Ruckelshaus, Environmental Protection Agency administrator, set the standard at .08 parts per million pollutants in the air. Opponents of his standard say that .08 parts per million of petrochemical oxidants is unreasonable and that .10 per million is more reasonable. . Environmental Education Instructional Activities 7-12, University of the State of New York, Education Department. . "Toward A New Environmental Ethic," United States Environmental Protection Agency, September 1971.

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
sulfur content of home heating oils and diesel fuels has been reduced more than 50% through increased use of low-sulfur crude oils and improved refining techniques. Progress has also been made with the heavy fuel oils used by industries and power plants. In New York City, for example, pollution from sulfur dioxide was severe a few years ago. But, in response to regulations, the sulfur levels of heavy fuel oils burned in New York City have been reduced 90% since the mid-Sixties."	. How can consumers help conserve energy resources as regards their automobile use? . Ask the science teacher or automotive teacher to explain the possibilities and difficulties of using other types of motive power such as the Mazda rotary engine, or the electrically powered car. . What should be the attitude of consumers toward the use of mass transportation in place of the private car? Would consumers be willing to accept the banning of private cars from central cities or the rationing of gasoline if necessary to prevent excessive pollution?	. "Guide to Efficient Energy Use in the Home," American Petroleum Institute, 1801 K Street, N.W., Washington, D.C. 20006 . "Environmental Education Strategies," University of the State of New York, Education Department. . "The Energy Crisis — Learn To Live With It," New York Daily News, February 11, 1973.



How you can conserve energy at home and on the road

CARS

1. **If you are about to buy a new car**, buy the smallest, most efficient car that meets your needs. The smaller the car, the more energy and money you will save.

2. **If you already have a car**, there are several things you can do to conserve energy:

   – Keep your car tuned up. Have a tune-up at least every 10,000 miles or according to manufacturer's recommendation, and keep your tires inflated to recommended pressures.

   – Join or set up a car pool for going to work. Driving a car, especially a large one, with only one person in it is a gross waste of energy. It's also expensive, and adds to air pollution.

   – Plan your shopping for the week, so you don't have to keep going to stores for small purchases.

3. **Better yet, walk or ride a bicycle.** If you can, walk or ride a bicycle to work or to shop. You will save money, conserve energy, reduce air pollution, and improve your health. Press for bicycle paths if they do not already exist, especially in areas where they can be used for day-to-day transportation.

THE HOME

1. **Heating and cooling** can consume nearly half of the energy used in a house. There are a number of ways this energy consumption can be reduced, many of which will actually save money.

   Insulation in most houses is much less effective than it should be. Adding extra roof insulation is a relatively easy way to cut heat transmission. Likewise, storm windows, if they are not already on your house, are fairly easy to install and can cut heat losses significantly. If possible, extra insulation can also be added to the walls of the house.

   Air Leaks in windows, doors, and wall and ceiling fixtures can increase your heating costs 15 to 30 percent, but are relatively easy and cheap to fix. Weatherstripping and sealing materials cost very little and can be readily installed by the homeowner.

   Furnaces can waste substantial amounts of energy if they are not properly cleaned and adjusted. A well-adjusted furnace saves energy and money.

   Lowering thermostats at night by 10 degrees will save ten percent or more on heating costs, and holding temperatures to 70 or 72 degrees will use less energy than higher settings. When you go on a trip, turn the thermostat down to 55 degrees.

   Air conditioners really are a luxury in most homes. But if you must have one, remember that some models are only half as efficient as others the same size. Check the Electrical Efficiency Factor (EEF); the higher the EEF, the more efficient the unit.

   Sunlight adds a substantial heat load to a house. Keeping it out in the summer will keep your house cooler, whether you have air conditioning or not. The west and south sides can both be shaded by deciduous plantings – use a trellis at first with a fast-growing deciduous climbing vine, backed up by slower-growing shade trees. Awnings, shades and curtains can all cut down on heat gains, as can heat absorbing or reflecting glass. Some companies make reflective materials that can be applied to existing windows.

   Attics build up heat unless they are well ventilated. If necessary, an attic fan can help. And the next time you re-shingle your house, remember that a white roof reflects far more heat than a dark one.

2. **Hot water heaters** can account for nearly one-third of a home's energy consumption. So don't waste hot water, and repair any leaky faucets.

3. **Lights** can consume a surprising amount of energy. For example, in a house with ten 100-watt light bulbs left on for an average of five hours a day, 150 kilowatt hours of electricity will be used in a week, 1800 kwh in a year. This is significantly more than a kitchen range uses. Incandescent lights also add to the heat load in a house in the summer; turning off unneeded lights will keep a house cooler. And if you have air conditioning, remember that for every watt reduction in lighting, there is an additional ½ watt savings in air conditioning.

4. **Appliances** add to a home's energy consumption. As shown in the chart, kitchen ranges, refrigerators, and clothes dryers are the largest consumers of power. If you are about to buy a new refrigerator, remember that a frost-free model may consume twice as much energy as a standard model, and that there can be substantial variations in power used by otherwise similar models.

   If you are planning to buy "convenience" appliances, such as electric hot combs, consider whether you really need them. While such appliances consume relatively small amounts of power, even small amounts add up. More importantly, be sure to operate major appliances, washers and driers, at non-peak times, early morning or evening.

Environmental Plan for New York State, New York State Department of Environmental Conservation

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
IN ADDITION TO THE SHORTAGE OF FUEL AND POLLUTION WHAT PROBLEMS HAS TECHNOLOGY RAISED FOR CAR OWNERS?		
. Specialized training is increasingly needed to service cars. . Specialized and expensive equipment is often required. Costs for service requiring this equipment must necessarily be higher than otherwise.	. One of the biggest problems with modern cars is the cost and difficulty of servicing them. Before air conditioning, power brakes, power steering, and other options were added, the skillful handyman was able to do much of the maintenance work on the car himself. . Have the auto shop teacher discuss the problems of servicing modern cars. . Arrange for a visit to a modern car repair shop. Note the fact that mechanics tend to specialize in one area of repairs – auto body work, electrical, brakes, air conditioning, etc. Ask the service manager to describe the specialized training now required to service a car. Have him show the specialized equipment needed and estimate the cost of such equipment.	. Americans spend an estimated $25-30 billion on automobile repairs annually. . Sylvia Porter in her syndicated column "Your Money's Worth," Albany Times-Union, May 4, 1972 suggests consumers "Start shopping for repairs BEFORE you need them. It's too late when your car conks out and you need it at once. Make a plan of action now: have a list of places you would take your car should you need minor repairs, major repairs, simple maintenance, etc. Check with your friends and acquaintances on their experiences with local auto repair shops. Concentrate on finding a shop with mechanics you can trust and then stick with this shop. However, for some types of work—such as muffler replacement or brake relining—you may be able to save money by patronizing a specialty shop which does a large volume of repairs in these areas and which has accumulated all the special equipment and expertise needed to perform them. Check out the reputation of

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		any outside speciality shop, though, before you turn your back on your regular mechanic." . "Behind the High Cost of Auto Repairs," Readers Digest, September 1969 . It is not unusual for mechanics to spend as much as three days per month learning to service new equipment. Obviously, the cost for such training is ultimately borne by the consumer.
. Cars have become so complex that few consumers have the ability or tools to care for them.	. If possible place on display an early and a recent model of the same make of car — such as a Model T Ford and a fully equipped LTD. Have a knowledgeable pupil or teacher illustrate the complexity of the modern car and the cramped space within which the mechanic must work. . Virginia Knauer, Special Assistant for Consumer Affairs, reports that the most frequent consumer complaint received by her office concerns automobile repair service. Do pupils consider this their chief consumer complaint? If not, what is?	. "After your car's odometer reads 50,000 miles or more, the likelihood becomes all too real that you'll have to have its engine overhauled or even replaced at a cost of hundreds of dollars. Certainly after your car is involved in a major crash, you are likely to need the costliest types of automotive repairs. Today it costs a minimum of $300 to buy a rebuilt engine for a compact car, and for larger models engine costs easily can soar into the $600 to $900 range. Today, according to the Insurance Institute for Highway Safety, the average cost of repairing two Chevrolet Impala sedans which crash front-to-side at only 10 miles an hour

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		is $893.15. The average cost of fixing up a single Ford Galaxie which has crashed into a stone wall at only 15 mph is $1,243." Sylvia Porter in her syndicated column "Your Money's Worth," Albany Times-Union, March 16, 1972.
. Labor costs are high	. Have the class list some of the problems that more complex cars pose in the way of repairs. . It is not unusual to be charged a minimum rate of $12.50 an hour for repair work, plus parts. Find out the cost of replacing a differential, alternator, damaged grill, etc. Have students study the effect of frequent style changes. What solutions are proposed?	. Bills have been introduced into Congress to "Authorize the Department of Transportation to set rules to reduce property damage and repair costs resulting from minor—but frequently shockingly costly—crashes. The rules would require manufacturers to build sturdier, more crash-resistant cars. By so doing, the standards would sharply reduce your collision insurance premiums, cut the deductible amounts you have to pay, also substantially lessen the time it takes to get your car repaired." "Require the DOT to make a comprehensive study of the methods of determining the susceptibility of passenger motor vehicles to damage, their repair costs, and the degree of protection for occupants of the cars. "Provide technical assistance and up to 90 percent of the cost to states to set

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. Frequent style changes add to consumer costs.	. Emphasis is so much on appearance without function that consumer costs are unnecessarily raised. . Ask the class to identify items that are not functional and are placed on cars for appearance sake only. (Ornate grills, hood ornaments, vinyl tops, fancy hub caps and exhaust systems, etc.) . How does the automobile industry promote the sale of such nonfunctional materials? What could consumers do in this regard to cut the costs of automobiles?	up a network of automobile 'diagnostic inspection demonstration projects' which would use the latest automated diagnostic equipment to inspect cars for safety features and emission control. Again, the goal would be to reduce your costs of automobile maintenance and repair. "Prohibit the widespread practice of setting back odometers (mileage indicators)—a prime way in which gypsters in the used-car field are defrauding buyers today." Sylvia Porter in her syndicated column "Your Money's Worth," Albany Times-Union, March 9, 1972.
. Car owners complain of unsatisfactory repair work.	. Collect experiences of car owners regarding their degree of satisfaction with repair work.	. "It's estimated that fully half of the nation's $25-30 billion annual bill for auto repairs and maintenance is spent for faulty work — or for work that's not done at all. No wonder that nearly 31 percent of all Americans feel that auto-repair service is completely or somewhat unsatisfactory. Complaints about auto repairs filed with the White House Office of Consumer Affairs outnumber complaints in every other category four-to-one. They concern not only repairs that should be routine,

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
		but also thousands of cases in which the work has or should have been done at the manufacturer's expense." "Auto Repairs: Beating the Buccaneers," Moneysworth, October 2, 1972.
. Cars could be made safer, and perhaps cost less.	. Engineers report that the following are typical examples of areas where better engineering would promote safety. - unsafe instrument panels; - inadequate bumpers; - protruding knobs and handles; - no roll-over bars; - inadequate padding; - inadequate visibility; - lack of fail-safe braking systems, involving two separate, independent braking systems for front and rear wheels.	. "The Liberty Mutual Insurance Company has remodeled five 1960 low-priced cars for greater safety. The chief engineer, Mr. Frank Crandell, has transformed each standard car into a comfortable seating space where one can take a blow of 5000 pounds from any direction and not only survive, but sustain very little or no injury. But more than this, the cars have steering shafts which cannot be driven backwards into your chest to kill you in spite of all the other protections built in." "Automobiles Can Be Made Much Safer," Consumers' Research, Washington, New Jersey, September and October, 1964.
. Pressure is on auto makers to fix unsafe autos.	. Currently the Congress is considering a bill requiring auto makers to fix unsafe autos and tires. Under the provisions of the Magnuson bill, industry would be required to keep track of used cars so that their owners could be notified of a recall to fix defective parts. Do students favor such a bill? If so, who, ultimately, would pay for this service?	. "More people die in crashes because they strike the steering wheel and steering column, or because the steering shaft is driven back into them, than from any other design feature (except inadequate door locks) of the seven million new cars that consumers bought last year. In

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		no car sold to date has anything like adequate correction been made of this second most serious design effect in the automobile. The deep-dish steering wheel is but a rudimentary and partial solution. . "The Liberty Mutual engineers made no effort to correct another glaring defect of current cars, the bumpers. Also, they made no effort to re-model the instrument panel, which, as used in one big-selling car, is in this writer's opinion, the most deadly instrument panel ever foisted on the American motoring public. In these two respects, they took the current cars just as they were." "Automobiles Can Be Made Much Safer," Consumers' Research, Washington, New Jersey, September and October 1964.
DOES THE HIGH PRICE PAID FOR REPAIRS APPLY TO OTHER CONSUMER PRODUCTS? . Yes, repair costs for almost all mechanical products are now high.	. Have students report on their or their families' experiences in having the products of a technological age repaired. Were prices reasonable? Was service prompt?	. "How to Fix It," Morton J. Schultz, McGraw-Hill. (The author reminds the reader that it is generally our own fault when our gadgets won't work.)

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
. When machines were less complex, consumers could usually repair them.	. Ask pupils to discuss with older people the matter of repairs of household products of other days. Were repairs needed so frequently? Could the average "handy man" householder make his own repairs?	. "Dear Sir, It seems to me that the Consumers' Association should do something drastic about the charges on repairs to household electric appliances. For example, recently we called a Westinghouse repairman to fix the handle of our refrigerator. He worked 3/4 of an hour, used $4.00 worth of parts and the bill was $18.00. When I went into the charges, they are $5.00 on leaving the plant, $6.00 for 1st 20 min., $2.00 for each 10 min. after. To me this is incredible, and encourages the repairman to work slowly. It also works against buying any Westinghouse appliances in the future. It works out to $12.00 an hour. Independent repairmen are unable to obtain Westinghouse parts." "High Repair Costs," quoted from Canadian Consumer, March/April, 1972.
. A modern repair technician has many costs of doing business which he must pass on to the consumer.	. Invite a repair technician (refrigeration, TV, heating, etc.) to discuss the reasons why repairs cost so much. What does a good technician need in terms of a capital investment, specialized training, experience? What kinds of expenses figure into his costs? (office rent and equipment, testing apparatus, employee benefits, stock of spare parts, travel time, taxes, periodic refresher courses, office help, etc.).	
WHY IS IT OFTEN CHEAPER TO GET A NEW PIECE OF EQUIPMENT THAN TO HAVE IT REPAIRED?		
. So efficient is mass production and so expensive the cost of labor for repairs that it is often cheaper to replace the equipment than to repair it.	. Have pupils list examples of occasions on which it was cheaper to buy new appliances or equipment than to repair them. Also have them list examples when it was cheaper to repair than to replace equipment. What conclusions do they draw?	. Labor costs are so high that it is often cheaper to replace a piece of mass-produced equipment than to have it repaired.

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
HOW CAN CONSUMERS KEEP REPAIR COSTS TO A MINIMUM?		
. Buy products with a good "life expectancy"	. Ask pupils to prepare a bulletin board display of pictures and articles on how to cut repair costs.	. Experts suggest the following to keep repair costs reasonable - check the "Frequency of Repair" record of appliances in Consumer's Union Buying Guide before buying. - read and follow the instruction manual
. Follow instructions	. Discuss the quotation: "When all else fails, read the instructions."	
. Learn how to make minor repairs yourself	. Repairmen find that many service calls are needless. Often a cause as simple as failure to turn on the current or replace a blown fuse results in a call for a repairman. Have students relate such cases and suggest ways to eliminate such calls.	. Use common sense. If necessary take a "handyman" course at a continuation or other school. . Avoid buying equipment with many extra "gadgets" such as power windows on cars. Each such refinement has the potential of failure and repair costs are often high.
. Find out in advance sources of service	. Why is it wise to keep a list of service centers for appliances and equipment you own?	
. Service or have serviced equipment to maintain it in good order	. Ask the shop teacher to discuss common causes of equipment and appliance failure (failure to oil or clean fans, motors, or replace filters; failure to check for loose connections or a blown fuse; failure to straighten bent hoses or clean clogged drains).	. One young business man made a lucrative income by buying discarded washing machines at $1 each. In most cases, the repairs consisted of replacing a belt that had come off, or freeing a drain in which a piece of clothing was stuck. He sold the "reconditioned" machines at $35 each.

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
. Treat appliances with reasonable care	. Have pupils cite examples of how machines can be misused (failure to empty the vacuum cleaner bag, overloading the washing machine, failure to dust condenser coils, etc.).	. "Teaching Kits" on the purchase, use, and care of five types of major home appliances. Association of Home Appliance Manufacturers, 20 North Wacker Drive, Chicago, Illinois 60606
. Do not void the warranty	. Often a warranty is void if machines are not installed properly or serviced regularly. Collect examples where warranties have been voided by "do-it-yourself" installation or careless repairs.	. "A Better Way To Live," filmstrip and manual for environmental education, Continuing Education Bureau, State Education Department, Albany, N.Y. 12224
. Support legislation and action to compel merchants who overcharge for repairs to mend their ways.	. Consumers have been remarkably successful in many instances where they felt that repair charges were unconscionable. . Investigate to see what agencies can support consumers with legitimate grievances against repairmen. Get information from the Bureau of Consumer Frauds, the Bureau of Consumer Protection, the local district attorney, or county consumer protection office.	. "Consumer suspicion of many television repair people has been verified in a 10-month investigation conducted by the Genesee County Prosecutor's Office. Rigging four television sets so that they could be repaired simply by replacing a $3.50 tube, Prosecutor Robert F. Leonard sent college student investigators to local TV repair shops. Of the 55 repair people in Genesee County, 38 made or recommended unnecessary repairs on the set ranging from a low cost of $40 to a high of $300. Fewer than one-third of the shops, 17 in all, replaced the faulty tube for a reasonable price.

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
WHAT CHANGES HAVE TAKEN PLACE IN RECENT YEARS TO MAKE CARS SAFER?		
. As a result of safety studies and consumer pressures a number of changes have taken place to make cars safer.	. Have students report on design changes to improve passenger safety Consider - bigger windows for improved visibility; - stronger bodies with roofs that won't cave in, side impact bars to reduce damage from objects hitting the side of cars; - sturdier bumpers, better able to withstand collision; - a standard height of bumpers (on 1974 cars) to resist bumpers of varying heights "overriding" each other; - safety belts that must be buckled up before the car will start; - combination lap and shoulder belts; - air bags (at an extra cost) on some 1974 models.	
WHAT FURTHER CHANGES ARE DESIRABLE?		
	. Ask pupils to consider what further changes are desirable. Should cars resist collision damage at speeds in excess of 5 miles per hour? Should car warranties provide protection for more than 12,000 miles or	. "Warranties and Guarantees," Consumers Research Magazine, Parts I and II, April and May, 1970, Washington, N.J. 07882

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
	12 months, whichever comes first? . How much extra would pupils be willing to pay for longer car warranties? for a greater measure of safety from impact?	
. Are basic engineering changes necessary?	. Some observers feel that a whole new concept of automobile transportation is needed. This might imply restrictions on horsepower to conserve gasoline and reduce pollution, the development of other means of power such as electrically or steam driven cars, the adoption of a different type of engine such as the Wankel engine, or the replacement, to the degree possible, of the automobile by mass transportation. What are pupil reactions to these suggestions?	. "Transportation and the Consumer," Secondary Curriculum Development, State Education Department, Albany, N.Y. 12224

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
. Many repairs are unsatisfactory	. Collect anecdotes and experiences regarding repairs and maintenance. . Ask an auto repairman to tell his side of the story. . Does the class favor proposed legislation (both State and Federal) to license and regulate repairmen? What might such legislation do to repair costs? Would it be worth the extra amount to insure that repairmen were competent in their trade? Would regulation necessarily mean improved repair work?	. "Americans will spend upwards of $22 billion this year on auto repair and maintenance, according to Senator Philip A. Hart, whose Subcommittee on Antitrust and Monopoly has completed an exhaustive hearing on the auto repair industry. He estimates that about one-third of that huge sum will be wasted, or, worse, it may even be spent to provoke or prolong unsafe car conditions. Outside of Everyman's personal experience, supporting evidence is hard to come by. "Yet enough exists to cause the average car owner qualms. For example, the Automobile Club of Missouri recently reviewed some 6500 repairs that had been recommended by its St. Louis diagnostic center. Only 65 percent of the work, which was performed by various auto repair shops, was judged satisfactory. Significantly, 17 percent of the brake repairs were judged unsatisfactory. Frighteningly, 57 percent of the front-end work was judged unsatisfactory." "The Auto Repair Outrage," Consumer Reports, April 1973.

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
DO MOST PROGRAMS FOR HANDLING PROBLEMS OF ECOLOGY OR IMPROVING SAFETY APPEAR TO INVOLVE ADDITIONAL EXPENSE, OR DO THE SOLUTIONS CREATE NEW PROBLEMS?	. Discuss the meaning of the term "There is no such thing as a free lunch." Is this true about solutions to the problems of technology? Does each step forward have a price tag? Give illustrations to prove your contention.	. "Fireproofing Children's Sleepwear Causes Problems," Associated Press report of May 11, 1973. This article reports that to meet governmental standards requiring children's sleepwear to be fire resistant will increase costs by millions of dollars. "Even those agents originally put into fabrics to check it (flammability) often contribute to it."
. In attempting to control the problems associated with the use of detergents new problems have arisen.	. The problems associated with the use of phosphate detergents (they tend to pollute rivers, lakes, and streams) have led to the use of low phosphate detergents. However, this solution has led to new problems. One problem is that consumers are less satisfied with washing results. A second problem is increased costs. A third problem is the possibility of accidental injury resulting from the use of substitutes, through skin irritation.	. "No-Phosphate Detergents: Do They Work?" Consumer Reports, October 1971. . "Return to Phosphates?" Consumer Bulletin, October 1971. . "Educating Consumers on No-Phosphate Detergents" Albany Times-Union, May 21, 1973.
WHAT ARE THE PROBLEMS OF RECYCLING?	. In the statement by Dr. R. H. Clark in the Source column, the steps necessary for successful recycling are described. If recycling has been tried in your community and failed, at which step did failure occur? Do pupils have suggestions as to how the process could have been more successful? If	. "Recycling has been proposed almost as a panacea for all ills. True, by returning materials for remanufacture we reap extraordinary benefits. The drain on our resources is diminished, the pollution generated by the primary industries is reduced, and the waste disposal problem is cut down. It is not a

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
	the program was successful, what elements made it so? Is the program still in operation? if not, why not? . What does the tendency to desecrate and litter our land tell about our sense of values? . Do you agree that the cost of disposal should be figured in the cost of production? (For example, should every new car be raised in price $25, the sum to be used to pay for the disposal of the car when worn out? . Should we license and police the visitors to outside recreational facilities to insure that grounds are not defaced? . Should there be regulation of the manufacture of containers that will not disintegrate such as plastic and aluminum? . It is said that the greatest factor in pollution is people and hence that the growth of population should be controlled. Do you agree?	panacea, but if recycling provides such attractive dividends, why is it that progress on this continent has been so slow? "We should realize that recycling involves three distinct but interdependent steps. First, the materials must be reclaimed from the waste or returned by the purchaser. Second, the reclaimed materials must be transported. Third, the materials must be sold at a price which, under current economic restraints, must at least cover the net cost of reclamation and transportation. It should be noted that the last step, involving purchase, guarantees that the materials will be reused and that equipment for reprocessing is available. Reclamation, transportation and economic utilization are therefore the key steps. "Most recycling projects in Canada and the U.S.A. have foundered at the first stage. Aside from the operation of a few municipal reclamation plants in the U.S., reclamation has been attempted by household segregation of garbage, volunteer recycling endeavours and the imposition of deposits on returnable containers.

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	. In most discussions of ecology, industry is blamed for destroying the land. However, there is another side to the story, little known by most of the public. Investigate what industry has done to preserve the environment. For example, do pupils know that companies have donated for public use land valued at between $50 and 100 million in the past five years? (See "Industry Steps in To Save the Land," U.S. News and World Report, March 19, 1973.) Find out from local merchants or the Chamber of Commerce what industry has done in your community regarding the problems of solid waste, air, sound, and water pollution. Have attempts been made at recycling?	The failure of these reclamation schemes, which depend heavily upon public response, has been so adequately demonstrated in the U.S. that failure in Canada should not surprise their advocates. At the best, segregated collections, recycling depots, and container deposits, as they are now operated in Canada, can only be expected to marginally reduce and recover the waste materials in municipal refuse. Most of the schemes must also be expected to operate at an economic loss unless heavily subsidized by volunteer labour or by a company which wishes to convey an ecological image. "The reclaimed and transported material must find an assured market. For material to be reprocessed in its existing form, it must satisfy the manufacturer both in terms of long term guaranteed quantity and quality. Very few recycling projects have met these conditions and the manufacturers, understandably, have been reluctant to invest in reprocessing equipment. Perhaps as a consequence, the market for reclaimed materials is uncertain, so uncertain, that the public is bewildered by 'authorative' contradictions. To
	. What has agriculture done to fight pollution? See "Breakthrough in the Fight Against Pollution," Farm Journal, December 1972.	

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
		summarize, it would appear that if recycling from municipal wastes is to be meaningful we need to develop better means for reclamation and transportation; handling costs need to be minimized and markets must be developed for recycled materials either in their existing or converted form." "Resources Reclamation & Recycling," condensed from a speech by Dr. R. H. Clark, Dept. of Chemical Engineering, Queen's University, quoted in Canadian Consumer, September/October, 1972.
HOW CAN THE CONSUMER CHOOSE WISELY AMID A CONFLICT OF CLAIMS FOR PRODUCTS?	. One of the most difficult jobs of the consumer is to pick the right product for the job and pay a fair price for this product. Have students relate examples where it was difficult to pick the right product (TV's, stereo equipment, sporting goods, etc.) . Have students relate their experiences in buying tires.	. One of the results of technological progress is that the consumer is so bewildered by what appears to be scientific reports that he cannot choose wisely. . "At the present time there is no reliable system which grades tires in terms of quality. The Federal Trade Commission described the problems in these words in 1966: "There exists today no industry-wide, Government, or other accepted system of quality standards of grading of

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	. Make a bulletin board display of pupils' suggestions of points to consider in buying tires. Have a tire salesman or service manager review the suggestions and give his reactions to them. (Among the suggestions might be these: - consider the use to which tires will be put; - choose tires strong enough for the load they will carry; - consider probable cost per mile rather than initial cost; - consider braking and stopping power).	(tire) industry products. Within the industry, however, a variety of trade terminology has developed which, when used in conjunction with consumer transactions, has the tendency to suggest that a system of quality standards or grading does in fact exist. Typical of such terminology are such expressions as "line," "level," and "premium." The exact meaning of such terminology may vary from one industry member to another. Therefore, the "1st line" or "100 level" or "premium" tire of one industry member may not be equivalent to the "1st line" or "100 level" or "premium" tire of another member since, in the absence of an accepted system of grading or quality standards, each manufacturer can determine what "line" or "100 level" or "premium" classification to attach to a tire.
	. What are some of the new terms consumers must become acquainted with to purchase tires wisely? (Bias ply, belted tires, radial tires, tire profile.)	The Office of Vehicle Systems Research is now carrying out for the Department of Transportation a program of research leading to the development of a 'Uniform Quality Grading System' for tires. When a system is implemented, it will provide clear and practical guidelines for selecting the level of quality necessary to

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
		suit your needs. "Tires — Their Selection and Care," National Bureau of Standards, Washington, D.C. 20234
. Despite the suspicion of self-interest, one of the best sources of information is the industry itself.	. Would product information from industry be of value to the consumer? Would it be to the ultimate advantage of industry to give accurate information to consumers?	. "How to Buy Tires Today," Changing Times, April 1973. . "There has been some attempt in certain circles to question the soundness of all information from industry sources because it will have a business bias, but there is no source better equipped than industry itself to provide basically useful information about its products." "Cultivating the Consumer Interest," Consumer Bulletin, April 1973.
. Unbiased consumer testing agencies provide a valuable resource.	. Investigate the type of information furnished by such consumer testing agencies as Consumer's Research and Consumers Union. What are their greatest values? What limitations do they have?	
. Government bulletins are of value to consumers.	. Consider some of the many bulletins put out by the Federal government. Could information material in these bulletins be of help to consumers?	. "Consumer Product Information," an index of selected federal publications on how to buy, use, and take care of consumer products. Consumer Product Information Center, Washington, D.C.
. Better Business Bureau information can be helpful.	. Check to see if there is a Better Business Bureau in your community. If so, invite a representative to discuss the services his agency offers. Present examples of consumer problems to him and ask for suggestions as to how they might be solved.	. The Council of Better Business Bureaus is increasingly concerned with the consumer field. The recent drive, "Get the Facts," urges consumers to read the label, understand the guarantee, shop for price and quality, learn the cost of credit, read "Use and Care" labels, and check seller's reliability.

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
DOES THE CHANGE IN TECHNOLOGY AFFECT OTHER ASPECTS OF LIFE?		
. Yes, changes in technology have affected every aspect of life, from birth to death.	. Have pupils consider how their lives have been changed by technology. Consider	. "Implications of Population Trends for Quality of Life," Family Economics Review, U.S. Department of Agriculture, March 1973.
- attitudes toward birth	- changes in contraceptive and abortion techniques that help to restrict population growth. Yet these techniques have raised grave moral questions which have been debated in legislative halls and elsewhere;	"Slower (population) growth would increase average income, conserve energy, avert pollution, and provide an opportunity to devote resources to the quality of life rather than its quantity." "Population and the American Future," Government Printing Office, Washington, D.C.
- attitudes toward death	- changes in life-prolonging techniques so that it becomes difficult for even doctors to agree when life should be considered ended. Again this issue divides the medical profession,	
- changes in food buying habits	- changes in foods, with emphasis upon prepared foods which can be eaten without extensive preparation time and effort. Questions about the nutritional value and consumer value of these foods are being raised. Consider "meatless meat," "texture flavored protein," meat substitutes, etc.	. "How 'Imitation' Foods Are Gaining Ground," U.S. News and World Report, May 21, 1973. "Much of the rise in food bills can be corrected if people rely less on quick-to-prepare foods and economize in other ways." Ibid.
		. "Experts foresee an expanded place on the family table for synthetic foods, made largely from non-agricultural sources, and protein-rich substitutes, processed mainly from agricultural raw materials." Ibid.

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
- transportation	- changes in transportation, chiefly due to increased use of the automobile and airplane. What has been the effect upon other means of transportation, such as the railroad, river boat, etc.? What changes in living and working patterns have resulted?	
	. How has technology changed the jobs of workers in industry, housewives, and pupils? What are the consumer implications of these changes?	
- purchasing	. What is the reaction of shoppers to the increased use of automation? Do they resent the difficulty of finding a clerk to help them? Would any inconvenience be repaid by greater speed in checking out?	. Increasingly stores are turning to computerized methods of handling sales. The latest development is a computerized checkout counter where shoppers place their selections on a conveyer belt. A scanning machine automatically records the price of each unit and the total price. It is claimed that the checkout process is speeded up and inventory control is improved by the process. It is expected that this system will be used in 50 percent of stores by 1975. . "Stores Test Checkouts by Computer," New York Times, June 1, 1973.

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- changes in free time and recreational patterns	. With the help of the social studies teacher, read and report to the class about the long hours and hard physical work needed to make a living before technology developed. What changes in the amount of free time and recreational patterns have emerged as a result of these changes?	. "The Consumer and Recreation," Bureau of Secondary Curriculum Development, State Education Department, Albany, N.Y. 12224
- social changes due to mass communication	. Again, with the help of your social studies teacher, consider the effect of mass communication upon patterns of living and thought. Is it true that this Nation which had easily disginuishable living and thinking patterns is being "homogenized" by mass communication and more travel between areas?	
- the flight of industry	. Consider whether changes in industrial processes and products have resulted in industry moving from one area to another, with consequent changes in employment patterns. Contact the New York State Department of Labor and Department of Commerce to determine whether there has been a relocation of industry within the State or an exodus from the State. To what degree, if any, is this due to changing technology?	. New York State Commerce Department . New York State Department of Commerce. . New York State Department of Labor.

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
- the impact of the computer	. Discuss the impact of the computer upon consumers. In what ways has it saved money, improved service, and in general improved the quality of life? Contact banks, the telephone company, large chain stores, distributors, and others who fill orders, check inventory, or do their billing by the use of such machines. . In what ways has the computer been a vexation to consumers? Exchange experiences in trying to "deal with the computer." What difficulties have been experienced by consumers who receive a reply from a machine instead of a human being?	. "A generation ago, who needed a computer? Today ... how could we get along without them? "Computers are everywhere. They make our airline reservations, stock our stores, figure our payrolls, monitor cardiac-care patients in hospitals, check our credit, help educate our children, conduct chemical experiments without using chemicals, forecast trends in everything from the economy to the weather, and ... well, computers are everywhere. "Most of us are aware that computers are important in today's society—but how many of us really comprehend that they have brought about the greatest technological revolution of our lifetimes? "But there's another side of the coin. For all its benefits, the computer's existence raises troubling questions. Will it continue to take jobs away from humans by doing them faster and better? Will its ability to store every disclosed fact of our lives in its limitless "memory" rob us of our privacy? Will it eventually be able to out-think man as well as out-compute him?" Advertisement of U.S. News and World Report, June 4, 1973.

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
WHY IS TECHNOLOGY NECESSARY EVEN THOUGH IT POSES PROBLEMS?		
. Despite the difficulties which technology poses, it is doubtful that this nation could even survive, much less make progress, without it.	. Consider ways in which technology has made life better. Among advances to consider are these: - in the field of medicine and health, improved means of detecting and treating disease; - in transportation, the development of high-speed trains and planes, pipe lines, space flights, etc.; - in production, mass production and quality control; - in food production and marketing, vastly increased yields, lower costs, efficient distribution; - in consumer buying, standard sizes, unit pricing, inventory control, dating of merchandise, etc.	. "New machines and new processes invented and discovered, especially during the past thirty years, are great aids to workers, enabling them to produce more per day and often with less effort. This development in industry is known as *technology*." "Consumer Economic Problems," Wilson-Eyster, South-Western Publishing Co. . "When the Computer Fouls Up Your Charge Account," Changing Times, September 1969.

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
	- in communication, vastly improved systems of communicating with others by means of the telephone, radio, TV, tape recording, and records; - in recordkeeping, automated systems of stock control, inventory, and customer billing.	. "The use of automated equipment is spreading rapidly throughout the business world. Banks use it to sort and handle checks. The government uses it to handle the mountains of record keeping required to operate its social security program. Hospitals and doctors use it to diagnose illnesses. Automation not only reduces the amount of time needed to produce goods and services, in many cases it does jobs that human beings cannot do. It has made space exploration possible. It operates underwater mining equipment. It controls the temperatures in bakeries and steel mills." "General Business for Everyday Living," Price, Musselman, Hall, Weeks, Gregg. McGraw-Hill Book Company, 1966
	. Have students consider the disadvantages of automation. How do convenience and service balance against the frustrations of dealing with a machine in such transactions as being over-billed for a charge or telephone account, buying merchandise from a defective vending machine, receiving form letters in answer to a complaint?	
	. Do students have suggestions as to how the interests of consumers can be matched with the problem posed by technology?	. The New York Times, in an article stated June 1, 1973 entitled "Connecticut to End Machine Collection of Highway Tolls," reports that the State will give up automatic toll collectors in favor of humans collecting the tolls. The reason given is that humans can collect tolls with greater speed.
	. Make a scrapbook of clippings relating to ways in which industry tries to solve consumer problems raised by technology.	

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
HOW DOES TECHNOLOGY AFFECT THE LIVES OF CONSUMERS?		
. Almost every important event about individuals is recorded in one or another data bank.	. Consider the extent to which human beings tend to become statistics in computerized files. Much as we might dislike the fact that so much of our private lives is on record, discuss the problems of a government without such data.	. In addition to local, state, and commercial data banks, the Federal Government now has a secret dossier on almost every American. For example, the - Social Security Administration maintains earnings records on 9 of 10 jobholders, also 28.9 million people drawing Social Security benefits, and 21 million people under Medicare. - The Internal Revenue system stores details from tax returns of more than 78 million individuals. - The Department of Agriculture has data on 800,000 borrowers and 60,000 investors in Farmers Home Administration systems. - The Department of Labor has records of 10 million persons in Federally financed work and training programs. - The U. S. Secret Service has computer tapes that list some 150,000 persons. - The Federal Bureau of Investigation has more than 160 million fingerprints on file. - The Department of Transportation keeps a record of 3.8 million persons who have been denied
. Some observers look with apprehension on this "invasion of privacy."	. On the one hand there is a chorus of complaints from individuals worried about an invasion of privacy. On the other hand is the need for such knowledge to prevent crime, to administer welfare and Social Security programs, and to carry out the mandates of the people. For example, without Social Security identifying numbers how would the Government be able to collect taxes on income? How would it be able to check welfare benefit claims? How could it administer the Social Security benefit programs? . Is the price of Government benefit programs inevitably a surrender of some measure of personal freedom?	

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
. It is probable that it would be impossible to operate present governmental programs without the accumulation of this information.	. What types of injustice or abuse could arise from such a system? . What, if anything, can be done to prevent the abuse of these computerized files? . Try to obtain a copy of "Records Computers and the Rights of Citizens" from the Secretary of Health, Education, and Welfare. . Consider also the benefits of technology. For example, an article in U. S. News and World Report, August 27, 1973, states "The normal extension of automation has reduced work hours roughly from 70 to 37 in the past century. The time off weekly could be 5 hours in the 70's, 6 in the 80's, and 7 in the 90's. The result could be a work week of 20 hours at the century's end."	licences or whose permits have been suspended or revoked. - The Veteran's Administration preserves records of 15 million veterans and dependents. - The Pentagon is screening files on 7 million Americans. - The Department of Housing and Urban Development has records on 5.4 Americans who bought homes guaranteed by the Administration.
. Technology brings both benefits and detriments to the quality of American life.	. What are the implications for society of a work week about half that now in effect? What changes will this make in family life, recreational patterns, and other aspects of American life?	

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
. Undoubtedly the future will bring increased applications of computer technology to all American lives.	. Consider the problems of personal finance that bother families now. Among them are the problems of keeping records, household budgeting, and income tax calculations. Are services to help the consumer with these problems now being provided in your area? Should such services be provided?	. A Seattle bank has begun a service to help subscribers keep track of household budgets and important records simply by telephoning a computer from home. The service gives subscribers 100 minutes of access to a talking computer, enough time for 200 average entries, for $6.50 a month. Every two weeks subscribers receive mailed printouts summarizing budget activities by categories.
	. Would students be interested in bill paying by telephone, merely pushing buttons on the telephone in proper sequence to debit their account and authorize payment to creditors? (Such a service is now offered by at least one bank.)	. Write the First National Bank of Seattle, Washington, for further details.
	. Other services offered by the bank include income tax data, a permanent inventory of possessions, a personal calendar to jog the subscriber's memory of important dates, anniversaries, and appointments.	
WHAT SHOULD BE THE ATTITUDE OF THE CONSUMER TOWARD TECHNOLOGY?		
. Computers make possible many of the services that consumers desire.	. Discuss the overall effects of technology. Would advances in production and	. "American supermarkets are on the verge of an electronic revolution that will hit consumers

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
. Industry would be crippled without modern computer technology. . Perhaps the easiest course of action is to accommodate to the benefits of technology while still maintaining the skills to fight back against the abuses. . Both the individual and the Government have an obligation to see that technology is not abused.	services be possible without it? List some of the effects that are familiar to students (telephone and other bills, bank services, metered pumps, etc.). Students who have part-time jobs may be able to cite instances of the uses of technology in their jobs. . What problems does technology pose for consumers? Is there a problem in confronting a machine instead of a human? How can consumers combat the problems caused by machines; such as the frustrations of recorded messages, repeated billing, errors, or mailing errors? . Have students prepare a message for their fellow students dealing with the problems of technology. Suggest effective ways to handle the problems of a technological age.	where most usually spend more than a few minutes every week — in the checkout line. "Perhaps as early as next year, and certainly within the next two or three years, supermarket shoppers may find checkers no longer punching cash register keys, grocery items no longer marked with their individual prices, and maybe even much shorter checkout lines. "The reason is that, like almost everything else, computer science is invading the grocery store, bringing changes in the way stores keep their supplies and order what they need. "But consumers will notice it most at the checkout counter, where an electronic scanning system will replace the present look-and-punch cash register method." Albany Times-Union, July 23, 1973. . "Some states—notably New York—have begun to pass laws to help consumers in their fights with computers. And if the "Fair Credit Billing Act" now before Congress were to become law and if you then were to be caught in a department store computer's billing error, you would have some protection no matter

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
		where you lived. The store would have to acknowledge the error within 30 days after you pointed it out and would have to resolve the problem within a maximum of 90 days. If not, the store would forfeit the amount of the alleged error up to $50." Albany Times-Union, August 21, 1973.
. Despite the difficulties, it is possible for the individual to fight back against unreasonable charges caused by computers.	. Conduct a forum to see what the experiences of pupils have been with regard to unjustified charges. . Consider the suggestions of Sylvia Porter in the Source column. Have pupils design their own scheme of action against what they consider to be improper billing.	. "So, in the meantime, what do you do if you are caught in an electronic brain's billing error? "First, take these precautions to help avoid billing errors: - Use your department store charge card or other credit card plate whenever possible. This at least will assure you that your own account number will turn up on your sales slip. - Check all your sales slips to make sure they are correct—and compare them to figures appearing on your monthly statement. This is particularly important if you are dealing with stores that have switched from including copies of individual sales slips to computerized 'descriptive' billing in which you are sent only a summary of your purchases and billings. - Each time you pay

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
	. Do you agree with the suggestions of Miss Porter regarding complaints involving a computer? . What other forms of relief are possible? Consider appeals to local and State agencies set up to help consumers. In New York State such agencies include the Department of Consumer Fraud and Protection, and the New York State Consumer Protection Board, 99 Washington Avenue, Albany. In New York City, there is the New York City Department of Consumer Affairs. The Legal Aid Society may be of help to consumers unable to pay legal fees. Finally, there is always the Small Claims Court where such conflicts may be resolved for a nominal fee. . Consider the proposal of Attorney General Lefkowitz as part of his "Bill of Rights" for consumers. The Attorney General requests that a bill be passed requiring that legal fees and court costs be paid by the merchant where a consumer is sued for payment of a computerized bill	a department store bill, return the portion of the bill identifying the transaction along with your payment. - When you receive your monthly statement, go over it carefully at once. Report promptly to the store any errors you uncover or questions you have. Now what should you do if the electronic brain goofs? How should you cry for help? - Don't include a letter of complaint with your payments. Send it separately to the complaint department or the credit department or customer relations department. In this letter, identify the bill which is in error by number or, if possible, include an identifying number of your account. - If you find you are corresponding with a computer, your key rule is to be as polite as you possibly can. Remember, if your argument is with a computer, it is the programmer and whoever else may have fed information into it who are at fault. Be sure to include your bill number or sales slip number when you ask for a correction. - If, after a few rounds of this type of gentle pleading, you

UNDERSTANDINGS	SUGGESTED PUPIL AND TEACHER ACTIVITIES	SOURCE
	which the consumer has already paid. Would students support such a bill? What steps should consumers take who wish to have such protection granted? (How can they influence favorable action?)	get nothing but a big electronic silence, then start getting human. One way is to send the next letter to the company president, noting that you plan to send extra copies to all board members. - Review in your letter all pertinent facts briefly and objectively. Send a copy to the collection agency as a protection for your credit rating. Point out that the store has no legal right to dun you for bills you don't owe or have already paid." Sylvia Porter, consumer advocate, quoted in the Albany Times-Union, August 21, 1973.
	. Obtain a copy of the recently passed New York consumer protection laws. Note that after November 1, 1973, a person feeling that he has not had justice in a computer billing foul-up can get the dispute settled within 90 days - or not have to pay it.	. New York State Consumer Protection Board, 99 Washington Avenue, Albany 12210, or 380 Madison Avenue, New York City 10017.

SUMMARY

This module has attempted to bring into focus some of the more common problems arising from the growth of technology. Many of these problems stem from our abuse of our environment; others develop from improvements of scientific processes and production. Still others develop from the high cost of labor and the attempts to find ways to circumvent this problem.

The essential problem that must be faced is that for each improvement there is an offsetting disadvantage. Civilization has "muddled through" many problems in the past, usually adopting a middle course between extremes. Certainly we would not want to go back to a primitive form of society, nor yet do we want to pay such a price for advance that the gain is not worth the offsetting costs. In an article by the editor of Consumers' Research in the June 1972 issue the problem is succinctly stated in the title

The Safety Trade-Off—risk/cost/benefit

Excerpts from that editorial follow:

> Safety programs are a currently fashionable topic of discussion and the subject of much new federal legislation. Safety is at the top of the current public affairs objective in the socio-political picture. As Harry N. Rosenfeld, Washington counsel, National Safety Council, has pointed out: "By law, safety has become a national goal and a federal objective." It is the subject of speeches, articles, books, and legislation. The goals include pure air, pure water, freedom from all kinds of pollution and noise, safety in automobiles, textiles, toys, household chemicals, food, drugs, and a number of other products.
>
> One of the first targets for cleanup action has been water pollution, the restoration of streams, lakes, and oceans to their original uncontaminated state. President Nixon has observed that: "How clean is clean enough can only be answered in terms of how much we are willing to pay and how soon we seek success. It is simplistic to seek ecological perfection at the cost of bankrupting the very taxpaying enterprises which must pay for the social advances the nation seeks."
>
> Pollution of the air from automobile emissions has been the subject of hot and protracted debate in many circles. The preliminary attempts to reduce the emanations from the family car have produced unhappy results, including difficulty in starting, increased tendency toward stalling (particularly at low speeds and on stops at intersections and turns), and higher consumption of gasoline. The stalling tendency could be a cause of passenger injuries or death, and the higher consumption of gasoline involves increased waste of scarce natural resources and causes increased pollution. The various safety features contemplated, or actually in use, are expected to

occasion a rise in the prices of automobiles in amounts ranging from $500 to $800 per car and perhaps up to 25 percent increase in consumption of gasoline. Already suggestions have appeared in the public press that it might be better to cut down on the number of automobiles in use by restoring public transportation on a wide scale. But so far the financial obstacles to such proposals have been insurmountable.

So long as the plans for magnificent cleanup and safety programs were chiefly confined to verbal and written enthusiasm, there was widespread support and public approval for the concept. As the bills have begun to come in and the changes in normal patterns of living have been effected, with a number of factory and other jobs reduced or eliminated by state and federal enforcement practices, enthusiasm has understandably dwindled.

In any discussion of pollution abatement and cleaner environment, engineers use the term "trade-off" which simply means the balancing of the cost against the benefits along with sober evaluation of the risks involved. There is no doubt that when health and welfare are involved steps to ensure safety must be given primary consideration. The problem, however, of what course of action to take calls for thorough exploration of the costs, the possible undesirable side effects of a particular step, and the benefits to be achieved.

Students now in school will be among the citizenry who must finally make the determination regarding the trade-off between benefit and cost. It is hoped that this module will stimulate them to begin thinking about this problem which will more and more occupy the thoughts of the Nation.

Man has created the technology to change his life and in many ways make it easier. But the question is whether he wishes to pay the price for advance. Hard choices are being forced upon us.

Already we are experiencing a conflict of needs.

Need	Possible Price
New sources of electric power	Possible contamination of streams, possible changes in climate due to vast evaporation and cooling systems in connection with nuclear plants.
More gasoline and heating fuels	Conflict with certain friendly nations such as Israel as a result of increased support of oil rich nations, chiefly Arabian.
	Higher prices to extract oil and gas from marginal sources.

Need	Possible Price
Conservation of gasoline	Shift from large cars to smaller, more economical cars
	Banning of automobile traffic in big cities
	Greater use of less convenient mass transportation facilities
	Shift to other sources of energy, possibly electricity or steam
Increase in domestic coal, oil, and gas supply	Reduction of import duties
	Subsidization of exploration and development
	Increase in prices to encourage development
	Elimination of some governmental controls
Increase in nuclear power sources	Tax incentives
	Fewer environmental restrictions
	Turning over public lands to the energy industries
Energy conservation at all levels	Requirement that all homes be well insulated
	Restrictions on travel and on energy use
	The development of a national energy policy

A country like ours needs the scientific advances made possible by technology and huge supplies of energy. But to develop this energy is not going to be easy. It is going to be expensive, time-consuming, and often unpopular. The important thing is for Americans to realize the problem and the costs and to develop a national program to achieve whatever goals are deemed desirable, weighing the costs against the benefits.